

Epoch Dynamic Comb Filter



User Guide v1.0.1



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1 - Welcome to Epoch

Epoch Dynamic Comb Filter is a unique alternative to traditional dynamics processes such as compression. While comparing favorably with classic analog compressors, Epoch also takes advantage of modern DSP, resulting in a powerful tool that excels in both sonics and ease of use.

Reimagine Compression

In addition to performing traditional dynamics tasks, Epoch introduces a new approach to compression by affecting the tonal character of a signal in relation to amplitude. The end result is that when Epoch compresses, it can simultaneously alter tone.

2 - Features

Comb Filter Section:

- Bi-Directional Sub-Sample Delay
- 360° Phase Rotator

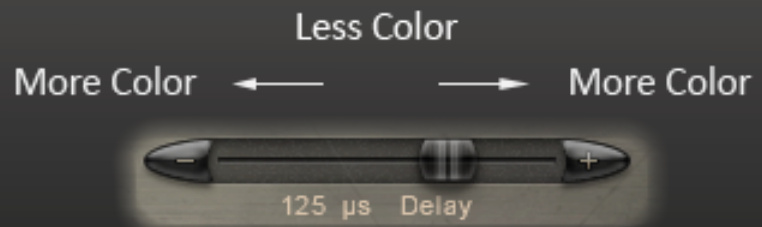
Dynamics Section:

- Feed-Forward and Feed-Back Detection Circuits
- Transient Sensitivity with Lookahead
- Optical Detector Type Behaviour
- Gate/Expander Type Behaviour
- Program Dependent Release
- High Quality Oversampling
- External Side Chaining

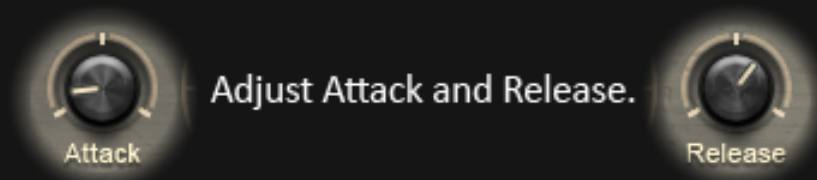
General:

- Undo/Redo with Unlimited History
 - Four Persistent Memory Banks
 - Double Precision Signal Path
 - Parallel Processing
 - Secret Sauce
-

3 - Quick Start Guide



Adjust the three knobs under the Dynamics Meter so the meter's needles are moving, and roughly balanced around the center tick-mark.

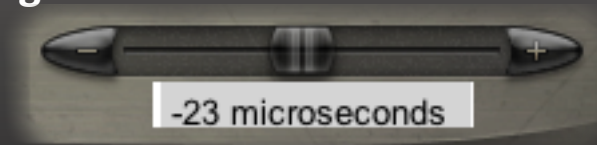


4 - Using the Controls

Fine Adjustment

Fine adjustment of Epoch's continuous controls may be accomplished by holding the "shift" key while moving a control.

Text Value Editing



A single click on any control's text label will open a text box for editing. Right-clicking on most of Epoch's knobs will also open the same text box (The **Comb Filter Section** controls have special right-click functions, as described below).

Resetting a Control

Double-clicking on any of Epoch's controls will reset that control to its default value.

Special Functions of the Comb Filter Section's Controls

Epoch's **Angle Knob** and **Delay Slider** have special right-click actions and mouse behaviors.

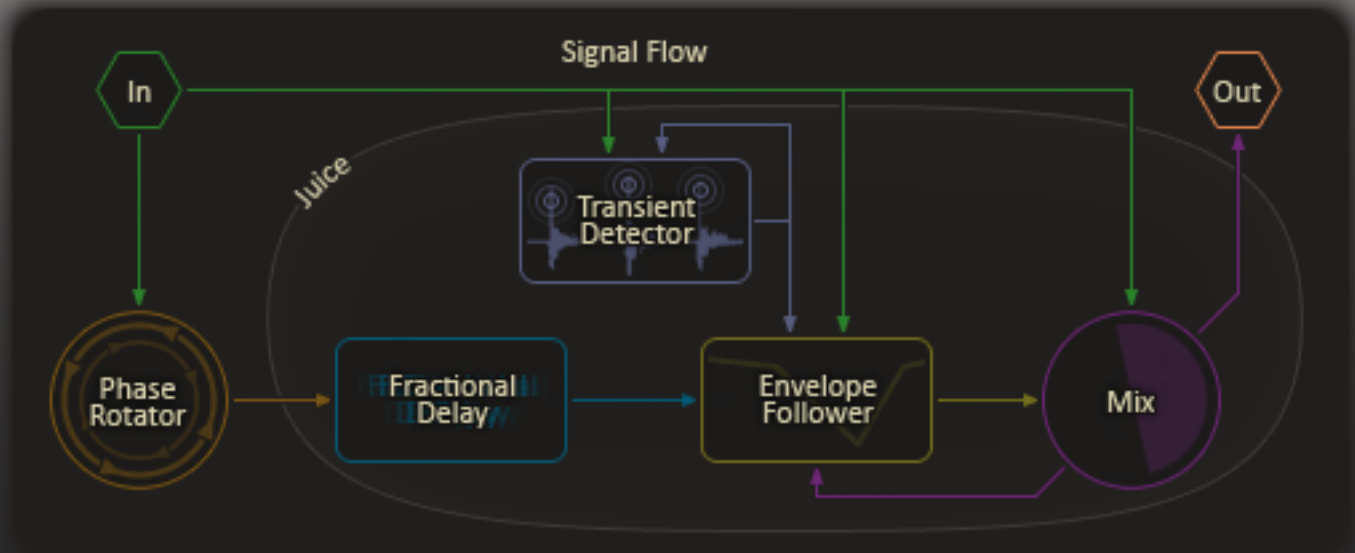
Right-Click Inversion Function:

Nearly every **Angle Knob** and **Delay Slider** setting has a negative or positive counterpart. Right-click on the **Angle Knob** or **Delay Slider** to invert their settings. Note that text value editing for these controls is still available by clicking directly on their text labels.

Bi-Directional Controls:

The **Angle Knob** and **Delay Slider** respond to both horizontal and vertical mouse movements. If you reach the edge of the screen while adjusting one of these controls, you may continue to adjust the control by moving the mouse along the screen's edge. Also, moving the mouse in a circular path will create an oscillating motion, which can produce moving flange and phaser type effects.

Signal Flow Diagram



To help you understand how Epoch works, there is a **Signal Flow Diagram** on Epoch's **Info Screen**. Click on the **Epoch Logo** to view it.

Accessing the User Guide from Epoch's UI



This **User Guide** is accessible from Epoch itself. Click on the **Cerberus Audio Logo** to open the **User Guide** in your web browser.

5 - Epoch Key Concepts

5.1 - Dynamic Filtering

Most filters and equalizers are static and linear: they apply the same filtering to the entire signal, all the time. Epoch, on the other hand, is a dynamic filter. That means it is reactive and responsive to changes in the signal, rather than static.

5.2 - Comb Filter Section

Epoch's **Comb Filter Section** determines the tonal color of Epoch's overall effect. If you're familiar with the "flange" effect, then you already know how colorful and cool comb filtering can sound. But comb filtering is an extreme effect that is generally

used sparingly, if at all. Epoch's Comb Filter Section is designed to harness the attractive aspects of comb filtering for a wider variety of musical and technical uses.

Fractional (Sub-Sample) Delay

The increments of Epoch's delay are scaled in fractions of a sample, smaller than most audio delays; and its overall range is much smaller too. Even when Epoch's delay is set to its maximum, the overall amount of delay is way too small to be perceived as a delay. However, even a 5 μ s difference in Epoch's delay time can result in a noticeable difference in tonal color and on the character of transients within the signal.

Phase Rotator

Epoch's phase rotator adjusts the amount of cancellation created by the comb filter and helps refine its tonal color.

Unlike most other phase rotators, Epoch rotates phase equally for all frequencies over a full 360° adjustment range.

5.3 - Dynamics Section

Epoch's **Dynamics Section** applies its **Comb Filter Section** in a similar manner to how a typical compressor regulates amplitude. If you already know how to use a compressor, then most of the controls in Epoch's **Dynamics Section** will be familiar to you.

Differences Between Epoch and Typical Compressors

There are some important differences between the design of Epoch's **Dynamics Section** and a compressor. For example, Epoch's internal transient detector causes Epoch's **Dynamics Section** to react urgently to transient events at all amplitude levels, rather than insisting that the amplitude rise above a particular threshold before it starts to act. Thus Epoch has controls for **Sensitivity** and **Strength** rather than for threshold and ratio.

Another key difference is that Epoch's dynamic effect is produced by cancellations, which depend on the **Comb Filter Section's** settings, rather than by direct gain reduction.

Feed-Forward and Feed-Back Detection Circuits

Epoch's **Dynamics Section** uses multiple envelope detection, which analyses the signal from several perspectives at once.

Feed-Forward Amplitude Detection – Sometimes referred to as “modern” detector topography, feed-forward detection tends to bite aggressively.

Feed-Back Amplitude Detection – Similar to the classic detector topography used by many pre-1980s analog compressors.

Transient Detection with Lookahead

Epoch's transient detection features sample-accurate lookahead. This helps Epoch identify and apply special consideration to transient events. Epoch's transient sensitivity can be adjusted using the **Tight Knob**.

Program Dependent Release

Epoch's Program dependent release (**PDR**) continually modifies its release profile in response to the program material. The **Invert PDR Switch** provides two types of PDR, one produces the Optical Detector Behavior described below, which is often desirable for vocals, while the alternate **PDR** behavior shortens the release time on loud percussive hits, increasing the probability of making harmonic distortion in place of a perceptually more obvious application of the comb filter.

Optical Detector Behaviour

Optical detector circuits are known for their "memory" or "hysteresis" characteristic. Their release time increases when they get hit harder. Epoch's release behavior becomes similar to that of an optical detector circuit when the **Invert PDR Switch** is active.

The "Vocal Push" factory preset demonstrates Epoch's optical detector behavior.

Gate/Expander Behavior

Epoch can optionally produce downward expansion and gating where it otherwise would perform gain reduction by cancellation. Downward expansion can be used to emphasize the loud or percussive parts of the signal, or to de-emphasize ambience or reverb.

The "Photon Expander" factory preset demonstrates Epoch's Gate/Expander behavior.

External Side-Chaining

Epoch's dynamics section can be controlled by an external side-chain signal. External side-chaining allows Epoch to perform creative and advanced mix techniques such as keying and ducking.

5.4 - Parallel Processing

Comb filtering is inherently a parallel effect: it is always created by mixing a delayed signal with the undelayed source signal. Since Epoch applies this effect dynamically, the result is automatically a parallel dynamics process, which is sometimes referred to as "New York style compression". We also recommend trying Epoch as a parallel process on your mixer.

5.5 - Mid (Sum) and Side (Difference) Processing

Epoch converts its input signal into mid (sum) and side (difference) components before processing, then returns them to right and left for output. This keeps existing phase relationships between left and right locked to each other absolutely. It means

that Epoch tends to preserve stereo information better than right/left or strapped stereo processes. It allows Epoch to control or compensate for changes in the apparent depth of your stereo image, especially under heavy processing.

5.6 - Internal Oversampling

Epoch performs internal oversampling for 3 important reasons:

1. It permits more accurate dynamic envelope tracking and faster attack times.
2. It enables Epoch to have a fractional (sub-sample) delay, which is important for controlling the comb filter effect.
3. It stops aliasing from occurring when Epoch's dynamics section is pushed hard enough to make harmonic distortion.

Epoch has two **Oversampling Modes: Regular** and **Clear**. **Regular** mode is more efficient, while **Clear** mode offers superlative fidelity.

5.7 - Double Precision Control

Double Precision Signal Path

Epoch's purpose-built DSP features a fully double precision (64 bit) internal signal path, as well as providing double precision input and output for host DAWs which support it.

Double Precision Parameter Control

An unusual feature of Epoch is that its parameter values are handled and stored in double precision form. Epoch's text boxes expose up to six decimal places for editing (greater than 32 bit precision), but Epoch can use and recall values with up to 14 (or at some values 15) decimal places of precision. Epoch's **Persistent Memory Banks** and **Undo** history follow suit. The result is smoother transitions between control settings, even when Epoch's controls are automated using external data with less than double precision.

Note: Recall and persistence are not implemented in the demo version.

6 - Controls

6.1 - Comb Filter Section Controls

6.1.1 - Delay Slider



The Delay Slider, calibrated in units of μs (microseconds), is used for creating tonal color.

When the **Delay** is zeroed, the **Comb Filter Section** produces cancellation at all frequencies. More color and less cancellation will be produced as the **Delay Slider** is moved away from the zero position.

6.1.2 - Angle Knob



The **Angle Knob** is calibrated in degrees of the unit circle (360° range). It can vastly alter both the tonal color and the depth of Epoch's effect.

Settings toward 180° tend to produce stronger cancellations, and thus more gain reduction. Settings nearer to 0° will produce weaker cancellations, but will create more effect in the frequency domain.

6.2 - Dynamics Section Controls

6.2.1 - Attack Knob



Controls the onset rate of Epoch's effect.

6.2.2 - Release Knob



Works in concert with Epoch's automatic program dependent release to determine the release profile of Epoch's effect. The **Release Knob**'s setting has a different meaning depending on the **PDR Invert Switch**'s setting, as follows:

When the **PDR Invert Switch** is activated, Epoch's release time can be longer than the value indicated, which represents a minimum time. Conversely, when the **PDR Invert Switch** is not activated, Epoch's release time can be shorter than the value indicated; in that case the value indicated by the **Release Knob** is a maximum value.

6.2.3 - Sensitivity Knob



Similar to a threshold control on a typical compressor, Epoch's **Sensitivity Knob** can bring a too weak or too strong signal into range. For best results, adjust **Sensitivity** so that the **Dynamics Meter**'s needles are moving and not pinned.

Note that Epoch's actual threshold of activation occurs when the needles on the **Dynamics Meter** move from their default zero positions (or ∞ when the **Invert Envelope Switch** is activated).

Tip: Increasing values on the **Strength Knob** will amplify the effect of the **Sensitivity Knob**, also causing the **Sensitivity Knob** to become increasingly reactive to control inputs. In this case: Use the "shift" key for fine tuning while making an adjustment.

6.2.4 - Strength Knob



The **Strength Knob** acts similar to a ratio control on a typical compressor. It multiplies

the strength of the dynamics processing by the indicated value.

6.2.5 - M/S Balance Knob



Adjusts the balance of mid (sum) and side (difference) components in Epoch's processed signal. The **Strength** setting can exaggerate the differences between mid and side, which may be re-balanced using the **M/S Balance Knob**.

High **Strength** settings can make the **M/S Balance Knob** seem oversensitive to control inputs. In this case, hold down the "shift" key for fine tuning.

6.2.6 - Invert Envelope Switch



Inverts Epoch's dynamics process: Portions of the sound which were filtered will be untreated, and vice-versa.

When this switch is activated, Epoch's effect becomes similar to a downward expander. When the **Angle Knob** is set near to 180°, Epoch will act similar to a gate.

Depending on whether any hold-time or hysteresis factor is desired, you might also activate the **PDR Invert Switch**, as described below.

6.2.7 - Invert PDR Switch



Inverts Epoch's **Program Dependent Release (PDR)**. When this switch is active, Epoch's **PDR** will tend to slow down (lengthen) the release time following percussive or transient events. When the **Invert PDR Switch** is inactive, Epoch's **PDR** will cause the release time to become shorter whenever it encounters percussive or transient events.

6.2.8 - External Side-Chain Switch



Routes an **External Side-Chain** signal to Epoch's dynamic envelope detector in place of the program signal. External sidechaining provides the means for powerful production techniques, such as keying and ducking.

Please consult your host DAW's user manual for specific information on how to route and use external sidechaining with plugins. Note that even if your host DAW does not explicitly support external sidechaining, you may still use the feature in Epoch by routing the external sidechain signal to Epoch's input channels 3 and 4.

6.2.9 - Output Knob



Adjusts Epoch's **output gain**, post effect.

6.3 - Character Controls

6.3.1 - Tight Knob



Increases the amount of transient detection.

6.3.2 - Classic Knob



Increases the amount of feed-back detection. Feed-back detection is common in analog compressors designed before the 1980s.

6.3.3 - Juice Knob



Adjusts the quality of Epoch's processing, which also affects its processing load.

Juice = 0

Lowest latency and CPU load.

Juice = 1

Adds a multi-resolution FFT process for the phase rotator.

Juice = 2

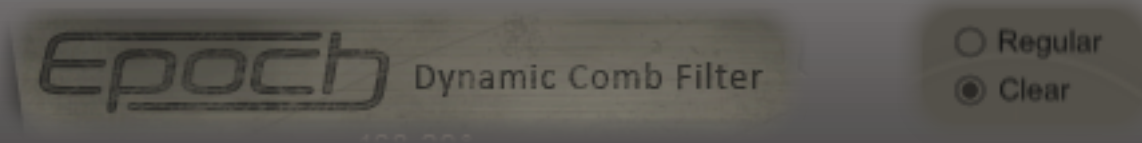
Adds our subtle **Secret Sauce**, and a more complex **Invert Envelope** function (expander/gate behaviour) .

Juice = 3 (and higher)

Adds increased internal oversampling and enables finer increments for the **Fractional Delay** (~5µs).

Note: Altering the **Juice** setting necessitates briefly interrupting playback. We recommend adjusting **Juice Knob** when the host DAW's transport is stopped.

6.3.4 - Oversampling Mode Switch



The **Oversampling Mode** switch, located on the **Info Panel**, may be accessed by clicking on the **Epoch Logo**. Epoch has two types of oversampling:

Regular – Relatively efficient internal oversampling with a mellow high frequency roll-off and a slight overall phase shift.

Clear – A high-quality internal oversampling process that is practically transparent.

Oversampling Mode is also indicated in the text display of the **Juice Knob**.



Note that changing the **Oversampling Mode** necessitates briefly interrupting playback. We recommend changing the **Oversampling Mode** when the host DAW's transport is stopped.

6.4 - Metering

6.4.1 - Dynamics Meter



The **Dynamics Meter**'s orange and green needles track Epoch's internally generated mid (green) and side (orange) detection envelopes. The meter provides a visual representation of how Epoch will apply the effect created by the **Comb Filter Section**.

- When the needles are at 0 : Epoch is not applying it's filter effect.
- When the needles are at ∞ : the filter effect is being applied fully.

We suggest to keep the needles swinging near the center tick-mark, and balanced against each other. Pinning the needles continuously at " ∞ " will create a static, rather than a dynamic effect.

6.4.2 - Gain Difference Meter

A red inner ring on the **Dynamics Meter** indicates the amplitude difference in dB between the input and output signals.

6.4.3 - Output Meters with Over-Zero indicators



Epoch's **Output Meters** are located above the output gain knob.

Over-Zero Indicators are provided because a signal which exceeds -0dB may cause clipping downstream, such as during conversion to the analog domain. However, a signal exceeding -0dB is usually not a direct concern for Epoch, since the floating point type signals handled by Epoch are unlikely to clip.

The **Over-Zero Indicators** will reset automatically when the transport is started, or when a setting has changed. They may also be reset manually by clicking directly on any of Epoch's meters, or on the **Output Knob**.

6.5 - Workflow Controls

6.5.1 - Persistent Memory Switches



Memory Settings are unique for each instance of Epoch in your DAW project. Their settings will be saved and restored each time you open your DAW project.

- to **Set** a memory : Right-Click (or left click with a modifier key).
- to **Recall** a memory setting : Left-Click.
- to **Clear** a memory setting : Shift-Click.

While the **Memory Switches** are not themselves automatable via a host DAW's track automation facilities, they can be used to write DAW track automation for several of Epoch's controls at once.

Note: Persistence and track automation support are not implemented in the demo version.

6.5.2 - Undo/Redo Switches



Epoch maintains an unlimited undo history for as long as the DAW project file is open. Epoch's **Undo/Redo Switches** permit stepping through its undo history.

While the **Undo/Redo Switches** are not themselves automatable via a host DAW's track automation facilities, they can be used to write DAW track automation for several of Epoch's controls at once.

Note: Host track automation support is not implemented in the demo version.

6.5.3 - Presets

Factory Presets

Epoch's provides several factory presets which can help you get acquainted, and provide handy starting points for your own settings.

User Presets

Epoch supports loading and saving the standard preset formats: .fxp, .aupreset, and .vstpreset. Each DAW host can decide how to present the user preset options.

Consult your host DAW's documentation for details on how to use host-based

preset functions.

Note: Saving presets is not implemented in the demo version.

7 - System Requirements

CPU: Intel Core-Duo or better.

Operating System: OSX 10.5 or newer, Windows XP or newer.

Host DAW: Any VST2.4, VST3, or Audio Unit compatible host.

8 - Installation

OSX:

1. Mount the Epoch .dmg disk image.
2. Drag the Epoch plug-in files to their appropriate alias-folders, as indicated.
3. Restart your DAW software or perform a plug-in re-scan.

Windows:

1. Unzip the Epoch install archive.
2. Drag the Epoch.dll (VST2) files to:

32 Bit Windows or 32 Bit plugins on 64 Bit Windows

Your designated VST plugins folder(s)

64 Bit plugins on a 64 Bit Windows only

'..\Program Files\Common Files\VST2'

3. Drag the Epoch.vst3 (VST3) files to:

32 Bit plugins on 32 Bit Windows OR 64 Bit plugins on 64 Bit Windows

'..\Program Files\Common Files\VST3' or '..\Program Files\VST3'

32 Bit plugins on Win 64 Bit Windows

'..\Program Files (x86)\Common Files\VST3'

or '..\Program Files (x86)\VST3'

4. Restart your DAW software or perform a plug-in re-scan.



9 - Updates

Updates for registered users are available at:

http://cerberusaudio.com/Software/UserArea/Updates_Epoch/

Public demo version:

http://cerberusaudio.com/Software/Demos/Demo_Epoch/

10 - Support

For support: please visit our **Support Page**:

<http://cerberusaudio.com/Software/Support/>

You may also contact us by email:

support@cerberusaudio.com

11 - Credits

UI Design:

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Thanks to:

Cockos, Inc.

<http://www.cockos.com>

GrooveQ

<http://groove-quantize.com>

Stillwell Audio

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Xenakios Softwares

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